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CATALYTIC AQUATHERMOLYSIS OF HIGH-VISCOSITY OIL USING IRON, COBALT, AND COPPER TALLATES

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The results of a study of the composition of active forms of the catalyst formed upon degradation of the precursor, based on the results of physical modeling of a sample of high-viscosity oil having high asphaltene and resin contents, are presented. Oil-soluble iron, cobalt, and copper tallates were used as the objects of the study. The composition of the separated powder of the active form of the catalyst was determined by X-ray diffraction analysis, and the catalyst particle size was determined by scanning electron microscopy. The SARA (saturate, aromatic, resin and asphaltene) analysis data revealed a marked decrease in high-molecular-weight oil components due to thermocatalytic cracking. The basic transformation mechanism is breakdown of the high-molecular-weight compounds along the sulfur-bearing bonds, as indicated by elemental CHNS (carbon, hydrogen, nitrogen and sulfur) analysis data. It is shown that the cobalt- and copper-based oil-soluble complexes turn are converted to sulfide forms and the iron-based complex is converted to the oxide form. According to the results of scanning electron microscopic analysis of the catalyst, the particle size is about 60 nm.

Keywords*: high-viscosity oil, catalyst, catalyst precursor, aquathermolysis, X-ray diffraction analysis, scanning electron microscopy.*

As a consequence of the increased worldwide demand for energy carriers and of the depleted reserves of traditional resources the development of nontraditional sources of hydrocarbons is attracting more and

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